

NAI's program in proliferation detection and defense systems concentrates on reversing proliferation

Mission Our program in proliferation detection and defense systems integrates detection technologies with critical systems analysis so that advanced technology can be optimized for operational settings. Technologies and analyses to identify, assess, and counter proliferant activities are central to this program.

Detecting Proliferant Activities In order to counter the proliferation of WMD, we must first detect and identify weapons-related activities. Livermore's achievements in detection and monitoring instrumentation are wide ranging. We have developed and fielded various sensor systems, including several unattended systems, and have a number of other systems—passive and active, on-site and remote, ground-based and airborne—under development.

For example, we are preparing to field a prototype of our Wide Area Tracking System (WATS) for detecting and tracking the movement of nuclear weapons material. WATS incorporates multiple inexpensive detectors and uses unique software to statistically compare simultaneous data from all sensors and determine the probability that a threat is present. WATS is being developed to provide a capability for regional tracking and monitoring of nuclear weapons and weapon materials.

Analyzing Options for Reversing Proliferation If activities indicative of weapons development or production are detected, the next step is to evaluate options for reversing proliferation. Computational simulation, combined with Livermore's extensive experience in nuclear weapons development, nuclear testing, and chemical and biological science, is central to this effort.

For example, we have developed a versatile and powerful modeling system for analyzing proliferation activities of foreign countries and for evaluating the consequences of possible interdiction options, including environmental and socio-economic effects. With this Counterproliferation Analysis and Planning System, we can model the various processes (chemical, biological, metallurgical, etc.) that others use to build weapons of mass destruction and their delivery systems.

Drawing upon information from many sources (e.g., the U.S. intelligence community, international commercial databanks, private industry), we can generate models of a specific country's proliferation activities. We can identify the function and location of suspected production sites; in some cases, we can even model the layout of individual facilities. By modeling proliferation activities at this level of detail, we can analyze the country's specific approach to weapons production. We can then identify critical processing steps or production facilities which, if denied, would prevent that country from acquiring weapons of mass destruction.

Recent Accomplishments

- Development and fielding of various sensor systems, including an unattended system called INSENS for the U.S. Immigration and Naturalization Service.
- Development of the Counterproliferation Analysis and Planning System, a versatile and powerful modeling system for analyzing the proliferation activities of foreign countries and evaluating the consequences (e.g., environmental and socio-economic effects) of possible interdiction options.
- Participation in a multiagency working group compiling a short list of credible evasive atmospheric test scenarios. We evaluated the limitations in capability of current space-based sensors to detect some of the most stressing of these scenarios. We proposed exploitation of two new types of signatures to compensate for the limitations of the current sensor systems: geomagnetic perturbations and air fluorescence induced by fission debris radiation.
- Support of the national effort to evaluate the utility of National Ignition Facility (NIF) as a weapon effects simulator; leadership role in an LLNL exploration of the feasibility of using NIF for vulnerability and hardening tests of nuclear warheads for the Dual Revalidation and SLBM Warhead Protection Programs.

Benefits to the Nation

We combine laboratory strengths in weapons technology, nuclear materials, chemical and biological science, instrumentation and monitoring, computational modeling, and systems and process analysis to provide technologies and analysis needed to detect and evaluate proliferation-related activities. Our analyses provide valuable and credible technical input to the decision-making agencies and individuals who must determine the U.S. response to such activities.

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